Introduction

Greater sage-grouse (*Centrocercus urophasianus)* are the largest grouse species in North America and are considered sagebrush obligates, relying upon sagebrush for both sustenance and shelter. Although many avian species utilize sagebrush habitats seasonally, it is relatively unique for birds to inhabit sagebrush year-round. Only the brewer's sparrow, sage thrasher, sage sparrow, greater sage-grouse, and Gunnison sage-grouse are considered sage obligates (Braun et al. 1976). All of these species are now believed to be declining (Braun et al. 2002).

The decline of greater sage-grouse populations has been of particular concern. Historically, sage-grouse occupied sagebrush habitats found throughout the southwest. Pre-settlement potential sage-grouse habitat covered an estimated 1,200,483 km² (Schroeder et al. 2004). The current distribution of sage-grouse is substantially smaller, with sage-grouse occupying 668,412 km², just over half of the available pre-settlement sagebrush habitat (Schroeder et al. 2004).

Translocations and reintroductions are tools that have been utilized while managing Greater Sage-grouse in the West. However, the use of these tools has not been properly tested. Reese and Connelly (1997) cautioned against the use of translocations and reintroductions because of the apparent failure of many attempts. Recently, Baxter et al. 2008 reported on a successful translocation effort in Utah which also identified criteria to evaluate future translocations of Greater Sage-grouse.

This proposal is to begin a new translocation research project on a small population of sage-grouse in northeastern Utah. We would like to test the methodology of Baxter et al. 2008 in a new area that has differing topographical features that may impact the success of the translocations. The Strawberry Valley translocations (Baxter et al. 2008) took place in a closed valley which may have impacted the post-release movements of released birds (Baxter, pers. comm.). Additionally, we would like to test the use of different season translocations (late summer vs. spring) and evaluate the success of the project with the criteria set forth in Baxter et al. 2008. The following objectives will be addressed with this research:

1. Annual survival of translocated birds and compare with resident birds
2. Spatial use of available habitat and movements of translocated birds
3. Integration of translocated birds with resident birds
4. Attendance of translocated birds on known leks
5. Late-summer/early fall releases compared to spring releases

Study Area

The study will be primarily conducted on Anthro Mountain in northeastern Utah. The Anthro Mountain study area is characterized by high, long, narrow and flat ridges which run north and south. These ridges are separated by deep, narrow canyons and draws. The primary vegetative community is mixed sagebrush and aspen (*Populus tremuloides)* with encroaching pinyon pine (*Pinus edulis*) and juniper (*Juniperus osteosperma*). The dominate sagebrush species is mountain big sagebrush (*Artemisia tridentata vaseyana)* and black sagebrush (*Artemisia nova*). Other native shrubs and grasses include: snowberry (*Symphoricarpos oreophilus*), rabbitbrush (*Chrysothamnus viscidiflorus*), lupine (*Lupinus argenteus*), bluebunch

wheatgrass (*Elymus spicatus*), junegrass (*Koeleria macarntha*), salina wildrye (*Elymus salinus*) and basin wildrye (*Leymus cinereus*). Some portions of the area have been seeded with smooth brome (*Bromus inermis*) grass. The elevation range is from approximately 7500-9092 ft. The primary land use in the area is cattle grazing.

There are four active leks on Anthro Mountain and the spring population is estimated at 160-170 adult grouse. The leks are scattered across the mountain and are located on three separate ridges.

The Ashley National Forest and Utah Division of Wildlife Resources have been conducting research on this small population of grouse since 2002. Basic ecological data have been collected over several years. Habitat condition has been evaluated and several habitat improvement projects have been completed or are under way. This small population is linked with two additional populations through long distance movements (>20km). The population also has at least four separate wintering areas that are separated by several miles and unsuitable habitat.

Sources populations for translocated grouse will be determined by the Utah Division of Wildlife Resources. These source populations will be large (>500 breeding birds), stable populations that are greater than 50 miles away from Anthro Mountain. Five possible sources are: Diamond Mountain, Three Corners, Western Box Elder County, Rich County, and the Parker Mountain.

Methods

Grouse Capture

Grouse will be located and trapped via spotlighting at roost sites in the capture sites. Trappers will spotlight from an ATV or on foot depending on the accessibility of the area to be spotlighted. Grouse will be captured with a long-handled hoop net or net with a net gun and then placed in a small sack to minimize stress.

Each captured bird will be weighed with a Pesola™ scale and fitted with an ATS A4060 necklace mounted, battery-powered radio-transmitter. The sex and age of each captured bird will be determined according to mass and plumage characteristics. Grouse will be considered an adult (entering second breeding season) if primaries 9 and 10 are in good condition. If primaries 9 and 10 are pointed, grouse will be considered a yearling (entering first breeding season; 10-15 months old).

Grouse Release

Grouse will be transported to the release site during the night and release the morning following capture. Approximately 20-30 females grouse will be captured during spring and released adjacent to one of the established leks (Baxter et al. 2008). Approximately 20-30 grouse (male and female) will be captured in the late-summer/early fall. An approximate ratio of 1:2 (males:females) is desired for the later release. The late-summer/early fall releases will take place during early morning in areas where resident grouse are known to be utilizing.

Tracking Sage-grouse Movements

All sage-grouse will be located at least once a week during the spring and summer. However, in order to ensure that all nest sites are located, female sage-grouse will be located 2-3

times a week after release. Throughout the fall and winter sage-grouse will be located once a month. If necessary, lost grouse may be located via aircraft.

GPS coordinates of each grouse location will be recorded in NAD 83. Additionally, the time, habitat type, identification number of visible wells, slope, aspect, and temperature will be recorded at each site. In the event that a grouse is found dead, the cause of death will be determined by examining the area for tracks, scat, and hair when possible. Grouse will be located with Telonics™ receivers.

Nest Searching and Monitoring

In order to locate nests, female sage-grouse will be located 3 times a week until the grouse is observed twice under the same shrub. Radio-signals will be triangulated from 25m away until the observer is able to obtain a visual location of the hen. (Aldridge and Brigham 2001). Nest will be monitored 3 times a week and hens will be approached cautiously.

Productivity measures will be calculated according to Schroeder (1997). Clutch size will be estimated by counting eggshells after the female leaves the nest site following a successful hatch or predation of the nest. The nest incubation initiation date will be estimated as the midpoint between the last date that the grouse is observed off the nest and the first date the grouse is observed on the nest. The hatch date or nest failure date will be estimated in the same manner. If a nest fails, the predator responsible (avian or mammalian) will be identified by searching the area for tracks, hair, scat and by looking at the condition of the failed nest. After nest failure, the location of the hen will be monitored twice a week to document re-nesting attempts. Hens with broods will be monitored 2-3 times a week.

Nest success will be defined as the percent of nests that hatch $\geq$ 1 egg (Schroeder 1997). Breeding success will be defined as the percent of females that successfully hatch $\geq$ 1 egg over the course of the breeding season (this may include more than one attempt at nesting). Fledging success will be defined as the percent of females that produce at least one chick to $\geq$ 50 days. Chick survival will be defined as the percent of chicks from a nest that live to $\geq$ 50 days.

Resident Grouse

Research will continue on the resident population of sage-grouse on Anthro Mountain. Between 20-30 grouse will be collared and tracked throughout the proposed research. This will enable us to complete the objectives outlined in this proposal.

Literature Cited

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